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A study was made to investigate the development of techniques to implement the principles of programed videotape instruction. The subject chosen was a lesson in simple descriptive statistics for use in an undergraduate education class. Production of the tape involved preparation of a script, choice of appropriate visual materials, preparation of a short pretest film and development of the full program. Although the tape was produced by faculty and production personnel, students were continuously involved at all levels. It was found necessary to formulate specific objectives in behavioral terms in the first phase of production. Student participation later in evaluation was considered highly important to the effectiveness of the finished product. Some tentative guidelines for development of programed video instruction were developed pertaining to student audience, subject matter, and the learning atmosphere, as well as to construction of the student response sheet, concept presentation, and considerations of pacing. Because of the time and expense involved in such a production the researchers felt experienced personnel to be a necessity. A short bibliography and a sample student response sheet are included. (SH)

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FINAL REPORT

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DEVELOPMENT OF TECHNIQUES TO IMPLEMENT THE PRINCIPLES OF PROGRAMMED VIDEO INSTRUCTION

May, 1969

U.S. DEPARTMENT OF

HEALTH, EDUCATION, AND WELFARE

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May, 1969

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CHAPTER I

SUMMARY

Of the many current innovations in teaching, the use of televised instruction and programmed instruction are among those most frequently discussed. Both types of instructional media have been used in the Teacher Education Program, College of Education, Florida Atlantic University, although conventional television instruction has been used more extensively than programmed instruction.

Several surveys of student opinion have revealed somewhat negative attitudes toward conventional instruction by television and more favorable attitudes toward programmed instruction. Consequently, there is a felt need on the part of the investigators to produce televised materials which have more student appeal than conventional programs and which provide greater opportunities for student involvement in the learning process. Hence, the production of a programmed video tape was selected for this project.

Although much has been learned about video programmed instruction, there is a need for further experimentation and research in the development of techniques to implement the principles of programmed video instruction. This became the problem for investigation.

The objectives of this investigation were to explore the possibilities of (1) adapting the principles of programmed instruction in video tape production, (2) identifying the technical aspects in preparing specific course material for video presentation, and producing

a video tape as a final outcome of developmental procedures.

The scope of the project was limited to the production of one tape for use in one course (ED 303, Center of Discovery II) in the Teacher Education Program.

The methods used were (1) involvement of selected groups of students in each phase of production, (2) procedures generally followed in producing television programs, and (3) special procedures required to apply the general principles of programmed instruction to programmed video instruction.

The major findings are presented below:

1. The formulation of specific objectives, stated in behavioral terms, is a necessary first step in development.
2. The involvement of students in all phases of development is highly recommended.
3. Although there does not seem to be any formal set of rules which must be rigidly followed, certain considerations seem to be important: the student audience, the subject matter, the type of student response elicited, and the learning climate.
4. The design of the student response sheet is of particular importance in programmed video instruction.
5. The personnel involved in production must have a certain expertise which seems to be gained mainly from experimenting in production.
6. The production of high quality programmed video tapes is facilitated by the physical facilities and studio equipment available to the production team.

7. The process of producing programmed video tapes is time-consuming, a rigorous undertaking, and expensive.

The investigators conclude that all personnel involved in production of programmed video tapes must have a certain expertise and that this expertise cannot be gained except by involvement in actual production. Since the process is demanding, it requires full time assignments of faculty and studio personnel to production and is almost prohibitive in cost, unless the tapes produced can be widely disseminated for classroom use by large numbers of students.

Although no rigid guidelines applicable to all types of programmed video instruction can be formulated by the investigators at this time, several points for consideration have emerged and have been presented in this report. These will be used as possible guidelines in the development of future tapes by faculty in the College of Education and studios at Florida Atlantic University.

The investigators highly recommend continued experimentation in the production of programmed video tapes. Reference should be made to the findings in this report for needed verification, modifications, or additions.

CHAPTER II

INTRODUCTION

From its inception in 1964, Florida Atlantic University has used television extensively as one means of instruction. Some courses are completely televised; other courses use television during one or two class sessions. Although television has been especially useful when large class loads are involved, some of the current uses of conventional TV instruction at Florida Atlantic University have severe limitations which are being recognized by both faculty and students in the College of Education.

Two recent surveys of 324 undergraduate Education students at Florida Atlantic University indicated that 60 per cent rated the conventional classroom lecture tapes as "below average" or "poor" as a learning technique.

The results of this survey caused some consternation on the part of the faculty assigned to the Centers of Discovery Program, for it is this Program which uses television more extensively than other programs in the College of Education.

The undergraduate Teacher Education Program consists of four courses taken in sequence by all Education majors: Centers of Discovery I, II, III, and IV. The content of the sequence is a longitudinal blending of the important concepts traditionally offered by most universities in psychological, philosophical, sociological and historical foundations of education and general methods and curriculum.

The Program features several innovations, one of these being the use of video tape instruction with large groups and by individual students in independent study. The tapes used have been produced by faculty in the studios of the Learning Resources Center. Since the faculty were involved in tape production, there was a common need to upgrade the quality of the conventional tapes as well as to develop a variety of television presentations which might have more appeal to students and be more conducive to learning. The development of a series of programmed video tapes was favorably considered. Not only would the series provide variety in presentations but it might also offer a method for overcoming some of the limitations of conventional programs.

The problem then became one of production. The investigators realized that the development of programmed TV material is a complicated and painstaking process. Komoski,[1] for example, has suggested that a great deal of experimentation has to be done in the development of programmed video materials.

Although much has been learned about programmed video instruction, there is a need for continued experimentation and research in how to implement these principles in actual production.

The objectives, then, for this project were to explore the possibilities of (1) adapting the principles of programmed instruction in video tape production, (2) identifying the technical aspects in preparing specific course material for video presentation, and

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[1]Filmed report by Kenneth Komoski (two year project funded under Title VII NDEA, WETA-TV, Washington, D. C. and Teachers College, Columbia University).

producing a video tape as a final outcome of developmental procedures.

CHAPTER III

METHODS

The choice of concepts to be presented in the pilot lesson were selected by the investigators with the assistance of four graduate students. The determination of behavioral objectives was established by the students who, from their immediate past undergraduate experience with ED 303, Centers of Discovery II, were able to give meaningful comment in regard to how given segments of the course content could be presented. Considerable dialogue between investigators and students resulted in preliminary scripts which encompassed the chosen concepts.

The methods generally followed the usual procedure of producing a television program. Additional procedures were used which were necessary to meet the special demands of producing a programmed TV lesson in simple descriptive statistics for use with undergraduate students in ED 303, Center of Discovery II.

Evaluation of procedures and product was carried out continuously both by those involved in production and by selected small groups of students who were enrolled in ED 303, the course toward which the final product was oriented.

Production started with preparation of a script presenting the concepts of mean, median, and mode. The concepts were presented by definition, examples, relative values, and application in differing situations, such as their use with varying shapes of distributions.

The next step was to formulate rough graphics for visuals and response questions for emphasis. Meetings of script writer, director-producer, and graphic artist team revealed a general lack of inter-communication as to the purpose of the program. Fortunately, the graphic artist had completed the graduate course (EDF 550) in tests and measurements at Florida Atlantic University and was able to explain to the Director the necessity of a graphic mode of presentation. Once it was fully understood by all concerned that a non-human talent production was desired, the script writer and a graphics consultant recomposed all of the rough graphics (approximately one hundred at that point) and resubmitted the script for the consideration of the director-producer and graphic artist.

At this stage a story board of the entire program was completed and reviewed several times. It was also presented for the first time at a story board conference to a selected group of graduate students enrolled in EDF 550, Measurement. The students were asked to give specific comments. Three of these students were from the upper quartile of the class and three were from the lower quartile. The lower quartile students contributed little in the way of comment while the upper quartile students suggested deletions and additions to the narration and graphics not previously considered by the production team. The students were also given the opportunity to use the response sheets and response cards during the story board presentation. This aspect of the presentation was well received by all participants. In addition, these meetings identified and clarified some of the special problems which occur in the development of a programmed tape beyond the usual problems

of sequence, timing, and continuity. For example, since selected concepts in elementary descriptive statistics was the subject matter for the content of the project tape, there immediately arose the problems of video presentation of charts, graphs, and numerical designations. Such materials, if at all elaborate or detailed, do not lend themselves to video presentation. As a result of the story board conference, many of the graphics had to be redrawn again with much deletion of detail. In many instances deletion of an entire graphic concept was necessary because it was unsuitable for video presentation. In similar fashion many of the simple special effects called for in the original script had to be eliminated because of technical limitations of the Learning Resources facility.

The final script was modified from the original with some concept presentations being six and seven generations removed from the original scripting and graphics presentation. Because the visual presentation was mostly graphic in nature, it demanded a high degree of involvement of the Graphics Department personnel in the overall production. This may be compared with the usual educational TV type production which emphasizes a live talent who uses occasional graphic aides ancillary to his audio presentation.

The amount of time required by the producer-director, the graphic artist and the script writer during the story board and production phase was substantial. The disposition of time and the costs involved became a concern to the Learning Resources Center personnel and much dialogue ensued regarding the relative merits of the human talent versus the graphics presentation type of educational TV. The discussions

were lively and animated, but constructive and helpful as they represented clarification of the constant problem of production output versus artistic thoroughness and viewer interest. Such concerns became and remained an integral part of the production of the programmed lesson.

A five minute film was produced of one portion of the proposed program to check for the visual effect or impact of the graphic presentation. It was shown to several groups of ED 303, Center of Discovery II students who were asked for their comments. This step further clarified the problems of video presentation of charts, graphs, and numerical designations due to the problems of size and clarity. The segment was produced in color film which the students generally found more interesting and attention-maintaining than the usual black and white type of instructional TV presentation.

The next step was to produce the entire program and review it in the light of the usual technical criteria as well as the continuity and sequencing of the concepts presented. This procedure resulted once again in the simplification and deletion of some graphics. It was the first opportunity the production team had to observe the adequacy of the response questions in their sequential entirety. The resulting kinescope was repeatedly reviewed and edited by the production team and by the outside programming consultant. The major change was the presentation of the response questions by narration only, as it had been noted the previous method of simultaneous video and audio presentation of the response questions tended to

detract from the use of the response card and response sheet by the viewer. After these changes, it was decided that the program was ready for final taping.

In summary, the method consisted of development, presentation, a clinical evaluation, and redevelopment. This procedure was satisfactory and was enhanced by the involvement of students as judges on all phases of the project.

CHAPTER IV

FINDINGS

1. Specific objectives for a programmed video tape should be formulated in the first phase. These should be stated in behavioral terms.

   Probably the first and most difficult question to answer in developing programmed video instruction is, "What is it that we want students to be able to do?" Although specific behavioral objectives are formulated in the planning phase, others may need to be developed as production progresses. Some of the original objectives may need to be discarded or modified as the materials are tested and evaluated by students and staff.

2. The involvement of students is a must, particularly in the early planning phase, in the evaluation of scripts from the standpoint of comprehension and appeal, and in the construction and evaluation of both the video graphics and the student response sheets.

   The nature of the student audience should be understood; otherwise there may be two quite opposing frames of reference--that of the producers and that of the students. What is deemed important and interesting by faculty may not be viewed the same way by students.

   Student involvement can help to eliminate gross errors in judgment on the part of the script writer and others involved in the development of the TV lesson.

A first version of any program should be subjected to student evaluation. This may involve some statistical analysis of responses and interviews with students to determine any difficulties encountered. Student viewer reaction to the pacing and sequencing of the script and the programmed responses is most helpful in the production planning for final versions of the lesson.

3. The rules for developing written programmed instruction cannot be applied universally to programmed video instruction. There do not seem to be any formal set of rules to which one must adhere rigidly. However, certain considerations are presented:

   (a) The student audience, the subject matter, the type of response that a student would usually make to the content, and the learning climate should be taken into consideration in developing a method of presentation. Hence, the experience of the script writer will suggest, to a large extent, the form of the script for a programmed video tape.

   (b) Responses should be appropriate to the material being presented. Because concepts and subconcepts can be presented visually and sequentially on TV, some response steps may be eliminated. However, the eliminated programmed responses and their learning reinforcement value may actually remain implicit in the TV presentation itself. Where in the lesson to elicit a written response needs to be finally decided by trial runs on segments of the tape. If careful planning is

done in the preparation of the visual continuity used to present each concept and if trials are used to check the pacing of such visual presentations, then one can expect a high percentage of correct responses from students. Eliciting a large number of responses appears to be less desirable in a programmed video tape than in a written program. Too much interruption in the visual presentation tends to destroy continuity and audience appeal. This is also a finding reported by Carl Ruble.[2] The potential of TV for visual presentation of ideas and for auditory reinforcement must not be overlooked when attempting to program for TV. There are possibly many reinforcements that can become a part of the TV presentation itself apart from the written responses.

(c) One should avoid becoming so intrigued by a particular mode of visual presentation that the concepts become secondary. The concepts themselves expressed as behavioral objectives should dictate the mode of presentation.

(d) In a written program, each student can pace himself--some proceeding at a much faster rate than others. In programmed video instruction, the pace is set by the script, even if the tape is individually viewed. Some students may find this "set pace" too fast or too slow. Perhaps, pretesting on content, followed by a series of tapes specifically designed for different levels of proficiency

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[2] Carl Ruble, personal communication, March 18, 1969.

might be a feasible approach to this problem. The development of "branching" programmed tapes might be another approach. In the same manner, the inclusion of a particularly difficult response (with a high failure rate) followed on the same tape with an in-depth remedial loop might be an acceptable mode of information presentation in a programmed lesson because of the novelty it introduces.

4. The design of the student response sheets is an important feature in programmed video instruction.

The design of the response sheets and the development of the tape are concurrent processes. Primary purposes of the response sheet are to help maintain viewer attention, to give immediate feedback to the student, and to provide data as to the effectiveness of the concept presentation.

The design of the response sheet should provide an opportunity for periodic muscular involvement, trial, and immediate correction of a student's response. It should also have a certain amount of novelty without the negative features of distraction. If equipment is available, response sheets can be very elaborate, designed for computerized equipment, Edex systems, or stillitron circuit boards. If equipment is unavailable, less elaborate designs must be used, the most simple and inexpensive requiring only paper and pencils. The investigators decided to use a simple response device; namely, "The Auto-Instructional Trainer-Tester Response Card." This is presented in the Appendix.

The design of a response sheet may have value beyond the fact

that it seems to reinforce the TV presentation. Multiple lesson response sheets can easily be produced in booklet form. The design may include references for additional independent study, questions for later discussions, or specific directions for review. These possibilities were explored but the lack of time prevented development.

5. The personnel involved in production of programmed video tapes must have a certain expertise which comes mainly from actual experimenting in production.

Although both investigators are knowledgeable in written programming and one has published a programmed text, their experiences in attempting to implement ideas generated in "brainstorming sessions" and to transfer knowledge to programmed video tape production were both challenging and frustrating. The beliefs that "one learns by doing" and "talk is easier than action" were certainly supported in this project. A certain expertise was acquired by the investigators and the staff in our Learning Resource Center. This all seems to point to the fact that <u>experienced</u> personnel is a key factor in production. Consequently, the future production of another tape would be less frustrating and the finished product of better quality.

6. The production of high quality programmed video tapes is facilitated not only by TV personnel with expertise in programmed instruction but also by the physical facilities and equipment available in the studio. This type of TV demands substantially more production planning time than is normally allotted for the

typical educational TV production. The production demands for this type of programming require a team approach with the production responsibilities continuously shared by the director-producer, the graphic artist who will do all the graphic work, and the faculty person who is the script writer. The production procedures must be definite and step-by-step, and the same team must be kept intact on either a full-time or regularly scheduled basis from the inception of the script-story board phase through to the final product.

7. The process of producing programmed video instruction is time-consuming, rigorous, and expensive.

The investigators found that the production of a programmed video tape required many hours of work. The total time spent on this project by faculty, artists, and TV personnel was estimated to be seven hundred hours for one tape. As expertise is gained and as studio facilities are expanded, the time required for future production may be markedly reduced. Parts of succeeding programs in the same series could probably be "farmed out" to other production personnel by the primary production team as procedures and standards are developed.

For this type of programming, at least one faculty member, one graphic artist, and one producer-director should be assigned full-time to production of a tape.

The investigators feel that the allotment of 20 per cent time assignment of a faculty member to production is too minimal. There are too many interruptions from other assignments for continuity of thought which is much needed in program development.

Both the faculty member and TV personnel should have large blocks of uninterrupted time. This should result in the long run in improved quality of tapes, and economy of production time, effort, and expenditures.

The expenditures needed for production are almost prohibitive, the cost of studio time being the most expensive single item. The total cost for our twenty-seven minute tape is estimated at $14,000.00. Even though the cost per tape might be slightly reduced as personnel become well-versed in programmed instruction, the production of a series of similar tapes would require an initial outlay of large amounts of money.

CHAPTER V

CONCLUSIONS

The investigators conclude that all personnel involved in the production of programmed video tapes must have a certain expertise which cannot be gained except by involvement in actual production. Since the process is demanding, experienced faculty and production personnel should be assigned full-time to production. The outlay in costs for a production is somewhat prohibitive; hence, unless extensive use is made of the produced tapes, the production costs of this type of instructional media becomes questionable.

The specific findings presented in this report merit consideration by others who are undertaking similar projects for the first time. Since no particular set of techniques for implementation can currently be considered a must for all productions, there is a need for continued experimentation in the development of programmed video instruction. The findings presented in this report need verification and possible modification. As experimentation continues, techniques may become more formalized and others will certainly emerge.

FLORIDA ATLANTIC UNIVERSITY
BOCA RATON, FLORIDA 33432

COLLEGE OF EDUCATION

MEASURES OF CENTRAL TENDENCY

A pilot lesson in programmed instruction

The following pages contain the response questions and a multiple choice answer card for the pilot lesson.

The answer card may be negotiated with a pencil eraser. Correct choices will appear as the letter "T".

It is assumed that the viewer has read the basic readings which are listed following the response questions.

The viewer should become familiar with the operation of the answer card and have read through the response questions at least once before viewing the program.

Comments and inquiries may be addressed to:

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Measures of Central Tendency

Response Questions

1. In a true symmetrical distribution, the mean, median and mode will fall at the same point in the distribution. From this we obtain the general term known as:

   a. central tendency
   b. average scores
   c. midpoint ranking
   d. class intervals

2. When we divide the sum of all the scores in a distribution by the number of scores in that distribution, the result we obtain is known as the:

   a. average score of the distribution
   b. arithmetic mean
   c. balance point of the distribution
   d. all of the above

3. Another term for the "mode" is:

   a. the average score
   b. the most popular score
   c. the distribution midpoint
   d. none of the above are correct

4. A bi-modal distribution occurs when there are two:

   a. means
   b. medians
   c. groups
   d. modes

5. The middle score of a distribution is also called the:

   a. median
   b. mean
   c. mode
   d. average

6. The relative positions of the measures of central tendency in a single humped, asymmetrical distribution, when we start at the hump and proceed toward the tail is always:

   a. the median, the mode and the mean
   b. the mean, the median and the mode
   c. the mode, the median and the mean
   d. the mode, the mean and the median

7. Which of the following measures of central tendency has the greatest usefulness in most situations:

   a. the mode
   b. the median
   c. the mean

8. When reporting the numerical values of central tendency from a skewed distribution it is advisable to always give:

   a. all three numerical values of central tendency
   b. any two numerical values of central tendency
   c. the mean and the mode values only
   d. the numerical value only

9. The use of mode or median over the mean for reporting central tendency is a justifiable procedure when:

   a. the known extremes of a population are not available for testing
   b. the data distribution is very flat in shape with no real "hump" in the middle
   c. a researcher is using psychological test data
   d. dealing with markedly skewed data distributions

Basic Readings

1. Laird, Dorothy, et al. Applying Basic Statistical Concepts. Wm. C. Brown Book Company, Dubuque. Chapter 1, pp. 3-7.

2. Spence, Janet, et al. Elementary Statistics, Second Edition. Appleton-Century-Crofts, New York. Chapter 5, pp. 32-43.

3. Thorndike, R. L. and Hagen, Elizabeth. Measurement and Evaluation in Psychology and Education, Second Edition. John Wiley and Sons, Inc., New York. Chapter 5, pp. 103-109.

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COMMON-CORE

The Alphabetical *Variable Answer* PROGRAMING DEVICE

NAME _____

DATE _____

PATENTED • VVN&N • TRADEMARKED

Auto-Instructional ®TRAINER-TESTER* *Response Card*

DIRECTIONS:
Rub off the block below where you think the correct answer is. Use eraser suited to your hand. "T" means "right"; any other alphabetical response — "E", "H" or "L" — means "wrong." However, for a particular exercise your instructor may choose "E", "H" or "L" instead of "T" as the correct answer. If you uncover a response differing from that designated as correct, and the instructor wishes you to learn the correct answer, continue erasing until that response is revealed; erase as little as possible.

QUESTION NUMBER	ANSWER OR TEXT REFERRAL FEEDBACK (a)	(b)	(c)	(d)
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